

## Modified ACES Portable Life Support Integration, Design, and Testing for Exploration Missions

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NASA's next generation of exploration missions provide a unique challenge to designers of EVA life support equipment, especially in a fiscally-constrained environment. In order to take the next steps of manned space exploration, NASA is currently evaluating the use of the Modified ACES (MACES) suit in conjunction with the Advanced Portable Life Support System (PLSS) currently under development. This paper will detail the analysis and integration of the PLSS thermal and ventilation subsystems into the MACES pressure garment, design of prototype hardware, and hardware-in-the-loop testing during the spring 2014 timeframe.

Prototype hardware was designed with a minimal impact philosophy in order to mitigate design constraints becoming levied on either the advanced PLSS or MACES subsystems. Among challenges faced by engineers were incorporation of life support thermal water systems into the pressure garment cavity, operational concept definition between vehicle/portable life support system hardware, and structural attachment mechanisms while still enabling maximum EVA efficiency from a crew member's perspective. Analysis was completed in late summer 2013 to 'bound' hardware development, with iterative analysis cycles throughout the hardware development process. The design effort will cumulate in the first ever manned integration of NASA's advanced PLSS system with a pressure garment originally intended primarily for use in a contingency survival scenario.